LECTURE 3

Astrophysics Literature

Introduction

Solid Work

- Need a reputation as a good researcher
- Work and results *must* be trusted
- Reputation with peers is very important

Innovative Thinking

- Need to contribute something new
- Need to understand the field to know what new is.

Write Proposals

- Propose for observations
- New data leads to new results
- Propose often
- Recycle proposals
- *Do not get discouraged*

Write Grant Applications

- Astronomers need funding
- Funding gives you some independence
- Write many applications
- Recycle applications
- *Do not get discouraged*

Be a Reviewer

- Referee for publications
- Reviewer for proposals
- Time consuming
- Establish yourself as “the” expert
- Insight into cutting edge of research

Share Your Knowledge

- Publish your results
- Attend meetings and present results
- Give seminars and talks
- Talk to reporters
- Give public talks

Work Fast and Work Hard

- Astronomy is competitive
- Be efficient
- You are judged on your publication record
- Publish or perish

Stay Ahead of the Curve

- Stay informed in your field
- Read the literature
- Attend meetings
- Keep an eye on the big picture

Publications

Unrefereed Publications

- Conference proceedings
- Astronomical telegrams
- IAU Circulars
- Research Notes

Good for announcing results and establishing priority.

Not a substitute for refereed publications.

Refereed Publications

Peer reviewed.
Primary form of publication.

Process:

- Write a paper
- Submit the paper
- Get a referee’s report
- Respond to the report
- Repeat as needed
    - Paper is accepted, or
    - Paper is rejected.
- Write another paper

Most papers take at least one iteration.

Major Astrophysics Journals

There are many journals.

Major ones:

- *ApJ* — observation and theory
- *AJ* — mostly observation
- *A&A* — all astronomy, European journal
- *MNRAS* — all astronomy, British journal
- *PASP* — good for instrumentation & methods

- *Science* — breaking news
- *Nature* — breaking news

- ○ *ARAA* — Review articles

Types of Articles

Articles

- Primary way to present results.
- Try to publish at least one first-author paper a year.

Supplementary Articles

- Primarily for publishing large data sets.

Review Articles

- Invited articles.
- Lot of work.
- High prestige

Letters

- For results that need to be published fast
- Short
- Often abused

Research Notes

- Work that does not merit peer-reviewed publication.

On-Line Literature

Preprints

- Articles that have been submitted, but not published.
- May or may not have been reviewed.
- arXiv
  - http://arxiv.org/
  - Updated daily
  - Spend 10–15 minutes each day scanning the titles and abstracts
- Contents may change!

Published Articles

- Journal Web sites
- Astrophysics Data System (ADS)
  - http://adsabs.harvard.edu/
  - Nearly complete collection
  - Some articles require a subscription
  - Powerful, but not too intuitive interface
- NED
  - Good way to find articles on a particular source

LaTeX

Typesetting system, not a work processor.
Some similarities to HTML.
Powerful.
Steep learning curve.
You *must* learn it.

LaTeX Advantages

- Output looks professional
- Very powerful, particularly for maths
- Free and universally available
- Easy to convert LaTeX to other formats
- Input is ASCII
- Most journals require it

LaTeX Disadvantages

- Steep learning curve
- Obscure mark-up names
- Not WYSIWYG, need to compile LaTeX files

62. $\displaystyle\int \frac{dx}{x\sqrt{x^2-a^2}} = \tfrac{1}{a}\arccos\tfrac{a}{|x|}, \quad a>0,$ **63.** $\displaystyle\int \frac{dx}{x^2\sqrt{x^2\pm a^2}} = \mp\frac{\sqrt{x^2\pm a^2}}{a^2x},$

64. $\displaystyle\int \frac{x\,dx}{\sqrt{x^2\pm a^2}} = \sqrt{x^2\pm a^2},$ **65.** $\displaystyle\int \frac{\sqrt{x^2\pm a^2}}{x^4}\,dx = \mp\frac{(x^2+a^2)^{3/2}}{3a^2x^3},$

66. $$\int \frac{dx}{ax^2+bx+c} = \begin{cases} \dfrac{1}{\sqrt{b^2-4ac}}\ln\left|\dfrac{2ax+b-\sqrt{b^2-4ac}}{2ax+b+\sqrt{b^2-4ac}}\right|, & \text{if } b^2>4ac, \\ \dfrac{2}{\sqrt{4ac-b^2}}\arctan\dfrac{2ax+b}{\sqrt{4ac-b^2}}, & \text{if } b^2<4ac, \end{cases}$$

67. $$\int \frac{dx}{\sqrt{ax^2+bx+c}} = \begin{cases} \dfrac{1}{\sqrt{a}}\ln\left|2ax+b+2\sqrt{a}\sqrt{ax^2+bx+c}\right|, & \text{if } a>0, \\ \dfrac{1}{\sqrt{-a}}\arcsin\dfrac{-2ax-b}{\sqrt{b^2-4ac}}, & \text{if } a<0, \end{cases}$$

68. $$\int \sqrt{ax^2+bx+c}\,dx = \frac{2ax+b}{4a}\sqrt{ax^2+bx+c} + \frac{4ax-b^2}{8a}\int\frac{dx}{\sqrt{ax^2+bx+c}},$$

69. $$\int \frac{x\,dx}{\sqrt{ax^2+bx+c}} = \frac{\sqrt{ax^2+bx+c}}{a} - \frac{b}{2a}\int\frac{dx}{\sqrt{ax^2+bx+c}},$$

70. $$\int \frac{dx}{x\sqrt{ax^2+bx+c}} = \begin{cases} \dfrac{-1}{\sqrt{c}}\ln\left|\dfrac{2\sqrt{c}\sqrt{ax^2+bx+c}+bx+2c}{x}\right|, & \text{if } c>0, \\ \dfrac{1}{\sqrt{-c}}\arcsin\dfrac{bx+2c}{|x|\sqrt{b^2-4ac}}, & \text{if } c<0, \end{cases}$$

71. $$\int x^3\sqrt{x^2+a^2}\,dx = (\tfrac{1}{3}x^2 - \tfrac{2}{15}a^2)(x^2+a^2)^{3/2},$$

72. $$\int x^n\sin(ax)\,dx = -\tfrac{1}{a}x^n\cos(ax) + \tfrac{n}{a}\int x^{n-1}\cos(ax)\,dx,$$

73. $$\int x^n\cos(ax)\,dx = \tfrac{1}{a}x^n\sin(ax) - \tfrac{n}{a}\int x^{n-1}\sin(ax)\,dx,$$

74. $$\int x^n e^{ax}\,dx = \frac{x^n e^{ax}}{a} - \tfrac{n}{a}\int x^{n-1}e^{ax}\,dx,$$

75. $$\int x^n\ln(ax)\,dx = x^{n+1}\left(\frac{\ln(ax)}{n+1} - \frac{1}{(n+1)^2}\right),$$

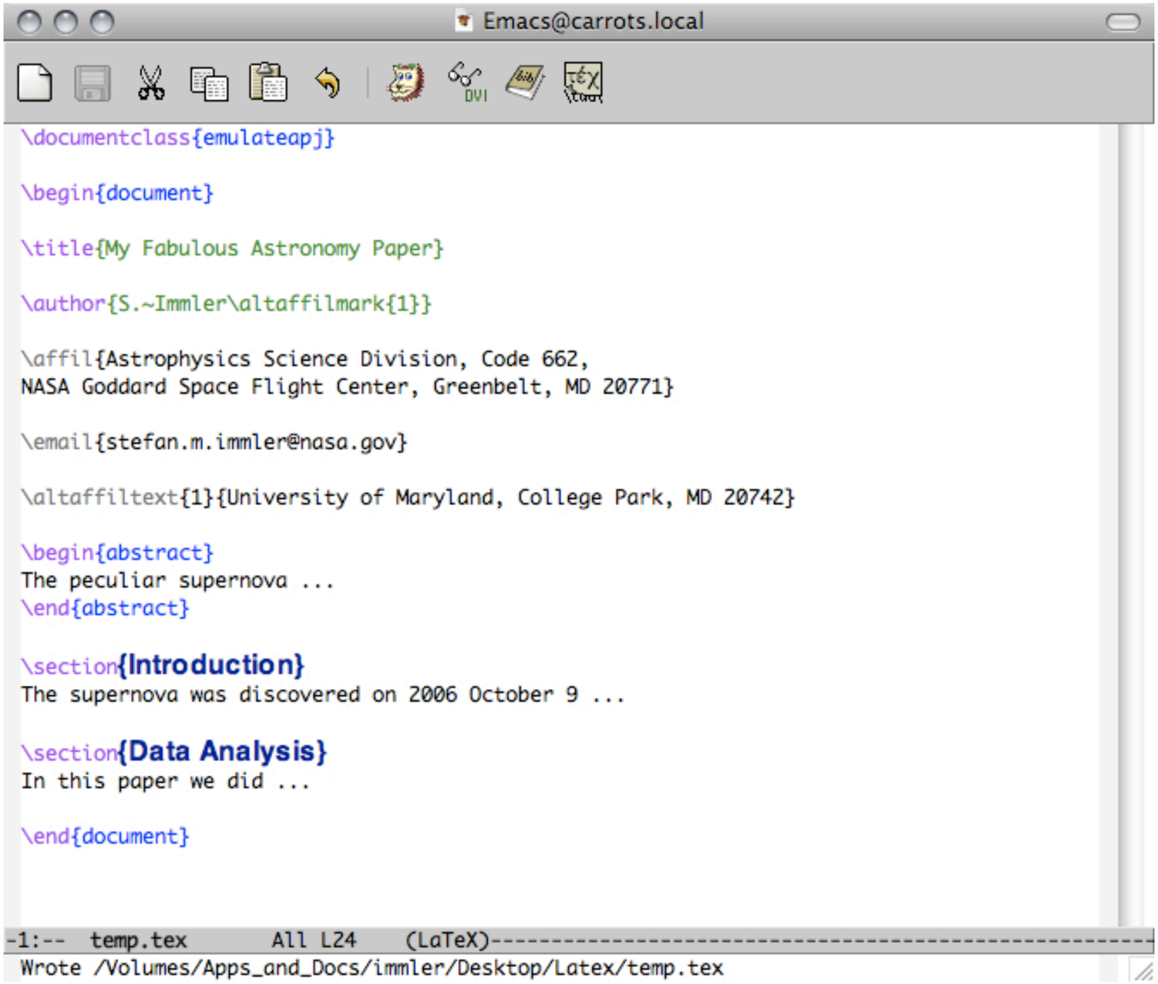
76. $$\int x^n(\ln ax)^m\,dx = \frac{x^{n+1}}{n+1}(\ln ax)^m - \frac{m}{n+1}\int x^n(\ln ax)^{m-1}\,dx.$$

Try doing this in Word

$\pm$	\pm	$\cap$	\cap	$\diamond$	\diamond	$\oplus$	\oplus
$\mp$	\mp	$\cup$	\cup	$\bigtriangleup$	\bigtriangleup	$\ominus$	\ominus
$\times$	\times	$\uplus$	\uplus	$\bigtriangledown$	\bigtriangledown	$\otimes$	\otimes
$\div$	\div	$\sqcap$	\sqcap	$\triangleleft$	\triangleleft	$\oslash$	\oslash
$\ast$	\ast	$\sqcup$	\sqcup	$\triangleright$	\triangleright	$\odot$	\odot
$\star$	\star	$\vee$	\vee	$\lhd$	\lhd^{b}	$\bigcirc$	\bigcirc
$\circ$	\circ	$\wedge$	\wedge	$\rhd$	\rhd^{b}	$\dagger$	\dagger
$\bullet$	\bullet	$\setminus$	\setminus	$\unlhd$	\unlhd^{b}	$\ddagger$	\ddagger
$\cdot$	\cdot	$\wr$	\wr	$\unrhd$	\unrhd^{b}	$\amalg$	\amalg
$+$	+	$-$	-				

$\widetilde{abc}$	\widetilde{abc}	$\widehat{abc}$	\widehat{abc}
$\overleftarrow{abc}$	\overleftarrow{abc}	$\overrightarrow{abc}$	\overrightarrow{abc}
$\overline{abc}$	\overline{abc}	$\underline{abc}$	\underline{abc}
$\overbrace{abc}$	\overbrace{abc}	$\underbrace{abc}$	\underbrace{abc}
$\sqrt{abc}$	\sqrt{abc}	$\sqrt[n]{abc}$	\sqrt[n]{abc}
f'	f'	$\frac{abc}{xyz}$	\frac{abc}{xyz}

Table 12: Some other constructions


Emacs@carrots.local
\documentclass{emulateapj}
\begin{document}
\title{My Fabulous Astronomy Paper}
\author{S.~Immler\altaffilmark{1}}
\affil{Astrophysics Science Division, Code 662,
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\altaffiltext{1}{University of Maryland, College Park, MD 20742}
\begin{abstract}
The peculiar supernova ...
\end{abstract}
\section{Introduction}
The supernova was discovered on 2006 October 9 ...
\section{Data Analysis}
In this paper we did ...
\end{document}
-1:-- temp.tex All L24 (LaTeX)
Wrote /Volumes/Apps_and_Docs/immler/Desktop/Latex/temp.tex

MY FABULOUS ASTRONOMY PAPER

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ABSTRACT

The peculiar Type Ib supernova (SN) 2006jc has been observed with the UV/Optical Telescope (UVOT) and X-Ray Telescope (XRT) on board the § observatory over a period of 19 to 183 days after the explosion. Signatures of interaction of the outgoing SN shock with dense circumstellar material (CSM) are detected, such as strong X-ray emission ($L_{0.2-10} > 10^{39}$ erg s^{-1}) and the presence of Mg II 2800 Å line emission visible in the UV spectra. In combination with a Chandra observation obtained on day 40 after the explosion, the X-ray light curve is constructed, which shows a unique rise of the X-ray emission over a period of ~ 4 months, followed by a rapid decline. We interpret the unique X-ray and UV properties as a result of the SN shock interacting with a shell of material that was deposited by an outburst of the SN progenitor two years prior to the explosion. Before and after this outburst, the progenitor had a mass-loss rate in the range $\dot{M} \approx (0.5-1) \times 10^{-4}$ M$_{\odot}$ yr^{-1} $(v_{\rm w}/1500$ km s$^{-1})$. Our results are consistent with the explosion of a Wolf-Rayet star that underwent an episodic mass ejection qualitatively similar to those of luminous blue variable stars prior to its explosion. This led to the formation of a dense ($\sim 10^6$ cm^{-3}) shell at a distance of $\sim 10^{16}$ cm from the site of the explosion, which expands with the WR wind at a velocity of (1300 ± 300) km s^{-1}.

Subject headings:

1. INTRODUCTION

SN 2006jc was discovered on 2006 October 9.75 (all times are UT) with an apparent magnitude of 13.8 in unfiltered CCD exposures (Nakano et al. 2006). No object was visible at the position of the SN on 2006 September 22 (limiting magnitude 19.0). Subsequent observations showed that the SN was around peak at the time of discovery (October 10.33: unfiltered magnitude 13.8, Nakano et al. 2006; October 13.67: Swift V-band magnitude 14.3, Brown, Immler & Modjaz 2006). Throughout this *Letter* we adopt an estimated explosion date around September 25 (± 5 days). Approximately two years earlier (2005 October) a variable object ($\sim$ 18 mag) was discovered close to the position of SN 2006jc ($0\farcs3$ offset; Pastorello et al. 2007) which is thought to be associated with SN 2006jc.

SN 2006jc is a prime example that illustrates the inadequacy of the SN classification scheme (Types I, II and their subclasses): strong He I features in optical (350- to 740-nm) optical spectra suggested a Type Ib SN (Crotts et al. 2006), while the observed 610-nm Si II absorption feature is characteristic of Type Ia SNe at early times (Fesen et al. 2006). A very blue continuum, additional emission lines from He I 388.9-, 447.1-, and 501.5-nm and the absence of the broad peak at around 540 nm suggested that SN 2006jc is a very peculiar SN of a rare Type Ib variety, closely resembling SN 1999cq (Matheson et al. 2000) and SN 2002ao (Filippenko & Chornock 2002), which were also characterized by strong He I emission lines. However, the SN didn't show the He I lines as PCygni profiles typical for Type Ib SNe and as in the case of SN 1999cq (Matheson et al. 2000), which indicates that SN 2006jc might be a Type Ic SN. Since these differences in the spectra might be related to the different phases of Ib/c SNe and the heterogeneity of these subclasses, we will refer to SN 2006jc as a peculiar Type Ib/c SN.

2. DATA ANALYSIS

Type Ib/c SNe (see Filippenko 1997 for a review) are the result of the core collapse of a hydrogen-deficient, massive star (e.g., a Wolf-Rayet star); its outer layers were stripped by either mass transfer to a companion or by a strong stellar wind. Spectra of SNe Ib suggest that the progenitors have lost most of the H envelope, while progenitors of SNe Ic have lost the H layer and much of the He layer.

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